CHAPTER 4

DESIGN AND CONSTRUCTION OF WATER STORAGE FACILITIES

4-1. Fabric tanks. Embankment supported fabric tanks are an alternative to conventional steel tanks. The tanks are usually made of lightweight durable rubber. When placed within a space formed by earthen embankments, the fabric tanks act as a reservoir lining with a floating roof. The tanks can be used to store water for fire protection, drinking, and process water for domestic and commercial uses. Following are some of the principal advantages of this type of reservoir:

- More economical than conventional tankage in terms of materials and construction time.
- Easy transport and handling.
- Minimal maintenance.
- Essentially a closed system - no contamination and no evaporation of stored liquids.

Some of the disadvantages are:

- Extreme caution must be exercised to insure the tank is not punctured, either during construction or operation.
- Materials of manufacture could be scarce during a mobilization situation.
- Lack of excess pressure control could create major problems.

4-2. Reservoir covers. All treated water reservoirs must be covered to prevent contamination by dust, birds, leaves, and insects. These covers will be, insofar as possible, watertight at all locations except vent openings. Special attention should be directed toward making all doors and manholes watertight. Vent openings must be protected to prevent the entry of birds and insects; vent screens should be kept free of ice or debris so that air can enter or leave the reservoir area as temperature and water levels vary. All overflows or other drain lines must be designed so as to eliminate the possibility of flood waters or other contamination entering the reservoir. Reservoir covers also protect the stored water from sunlight, thus inhibiting the growth of algae. Further prevention of algae growth or bacterial contamination, due to the depletion of the chlorine residual, can be obtained by maintaining sufficient flow through the reservoir so that

water in the reservoir does not become stagnant. Minimal flows through the reservoir also help to prevent ice buildup during cold periods.

4-3. Overflow. All storage tanks should be provided with altitude valves to prevent overflows. These altitude valves will be installed in concrete pits having provisions for draining either by gravity or pumping. When altitude valves are not available, overflow piping will be used. Overflow drainage piping will not be connected to sanitary sewers.

4-4. Drains. All storage tanks and reservoirs will be provided with drains for tank serviceability and maintenance. Drains will not be connected to sanitary sewers.

4-5. Instrumentation and control. Storage measurements are used for inventory and system controls. Elevated and ground storage measurements will be made to accomplish the following:

- determine the water depth in the tank.

- initiate the shut-down of supply pumping units and actuation of an overflow alarm in that order at high storage level.

- initiate the startup of supply pumping or well pumping units or distribution pumping unit shutdown.

4-6. Disinfection. Potable water storage facilities, associated piping, and ancillary equipment must be disinfected before use. Disinfection will be accomplished following procedures and requirements of AWWA D105 or the requirements of local regulatory authorities, whichever is more stringent. In no event will any of the above equipment or facilities be placed in service prior to verification by bacteriological tests that disinfection has been accomplished.

4-7. Design analyses. The design analyses will set forth the basis by which storage capacities and locations have been determined. Except where standard specifications for tanks or towers are used, the analyses will show the method by which the structural adequacy of the unit has been determined. Some typical design examples have been presented in appendix A.